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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,303	12/19/2005	Mitsuru Shingyohuchi	2271/75606	2807
23432	7590	09/13/2007	EXAMINER	
COOPER & DUNHAM, LLP			LEGESSE, HENOK D	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/561,303	SHINGYOHUCHI ET AL.	
	Examiner Henok Legesse	Art Unit 2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on ____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-15 is/are pending in the application.
 - 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) Claim(s) ____ is/are allowed.
- 6) Claim(s) 1-15 is/are rejected.
- 7) Claim(s) ____ is/are objected to.
- 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on ____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. ____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>12/19/2005</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3,7-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Kusunoki et al.(US 2004/0207671 / WO 2003/026897).

Regarding claim 1, Kusunoki et al teaches an image formation apparatus (fig.4) capable of forming a relatively large ink drop by sequentially discharging a plurality of ink drops from an ink drop discharging head (paragraph 0114, fig.6), the sequential ink drops merging before reaching a print target medium (paragraph 0119), the image formation apparatus comprising:

pressure generating means (52, fig.6) for discharging one or more of the ink drops other than an ink drop that is not followed by any more of the ink drops in a given printing cycle (the last ink drop) (see fig.11a-11b and paragraphs 0114-0119) at an interval nearly equal to $(n+1/2) \times T_c$, where n is an integer equal to or greater than 1, and T_c represents a resonance cycle of a pressurized ink chamber of the image formation apparatus, the interval being measured from when a corresponding preceding ink drop is discharged (see fig.11a-11b and equation 1 in paragraph 0117; each driving pulse in fig.11a discharges an ink

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droplet at an interval equals to $tr + Pw + tf + td = nxTs$ where n is an integer equal to or greater than 1, and Ts represents a resonance cycle of a pressurized ink chamber. And the value of $nxTs$ is nearly equal to $(n+0.5) \times Tc$.

Regarding claim 2, Kusunoki et al further teaches the one or more of the ink drops other than the last ink drop are discharged at an interval nearly equal to $1.5 \times Tc$ (see the equation1 in paragraph 0117, $tr + Pw + tf + td = nxTs$. When n is equal to 1 or 2 the interval is nearly equal to $1.5 \times Tc$).

Regarding claim 3, Kusunoki et al further teaches ink drops other than the one or more ink drops that are discharged at an interval nearly equal to $(n+1/2) \times Tc$ are discharged at an interval nearly equal to $n \times Tc$ (see fig.11a-11b and equation1 in paragraph 0117, each driving pulse in fig.11a discharges an ink droplet at an interval equals to $nxTs$, which is also nearly equal to $(n+0.5) \times Tc$).

Regarding claim 7, Kusunoki et al further teaches wherein four or more of the sequential ink drops (fig.11, paragraphs 0114) merge during flight to form one of the relatively large ink drops (paragraph 0119).

Regarding claim 8, Kusunoki et al further teaches a waveform containing driving pulses for discharging the sequential ink drops (fig.12) includes a waveform for suppressing a residual vibration after a driving pulse for discharging the last ink drop (paragraphs 0124,0129).

Regarding claim 9, Kusunoki et al further teaches the waveform for suppressing the residual vibration (figs.12, 13; paragraph 0124) is provided within an elapsed time equivalent to Tc (fig.14) after the last ink drop is discharged (paragraphs 0129,0130).

Regarding claim 10, Kusunoki et al further teaches a medium-sized ink drop (Mj2, fig.16; paragraph 0144) and a small-sized ink drop (Mj3, fig.16; paragraph 0138) are each formed by selecting a part of driving pulses (fig.15) for forming the relatively large ink drop (Mj1, fig.16; paragraph 0141-0142).

Regarding claim 11, Kusunoki et al further teaches the driving pulses include a waveform for vibrating a meniscus without causing an ink drop to be discharged (paragraph 0136).

Regarding claim 12, Kusunoki et al further teaches the driving pulses (figs.10, 11) include a section wherein a voltage is applied to the pressure generating means (52,fig.6) for pressurizing ink in the pressurized ink chamber (46) (paragraphs 0110,0139).

Regarding claim 13, Kusunoki et al further teaches the pressure generating means (52,figs.6, 7) is a piezoelectric device (paragraph 0092), and

the piezoelectric device (52) is recharged in the section wherein said voltage is applied (paragraph 0093).

Regarding claim 14, Kusunoki et al further teaches wherein the pressure generating means (52,fig.6) for generating the pressure for pressurizing the ink of the pressurized ink chamber is a piezoelectric device (paragraph 0092), a displacement direction of which is d33 (arrow A in fig.7, paragraph 0093).

Regarding claim 15, Kusunoki et al further teaches support sections (64,fig.8) of the piezoelectric device (fig.8) support partitions of the pressurized ink chamber (46) (see also figs.6, 7; there is a support structure to support ink chamber 46).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

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Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 4 - 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kusunoki et al.(US 2004/0207671 / WO 2003/026897).

Regarding claim 4, Kusunoki et al further teaches an ink drop is discharged by the pressurized ink chamber being contracted (by the rising edge of the 2nd,3rd,... pulses in figs.11, 15) after being expanded (by the falling edge of the 1st,2nd,3rd,... pulses in figs.11,15), where a volume of contraction (by the rising edge of the 2nd,3rd,... pulses in fig.15) is greater than a volume of expansion (by the falling edge of the 2nd,3rd,... pulses in fig.15), and where the volume of expansion may take a positive value or zero (see fig.15 the falling edge of the 2nd,3rd pulse take a positive value) (see also fig.10 and paragraph 0107). Kusunoki et al does not expressly teach the ink drop formed by the above pulses is a first ink drop. However, it would have been obvious to one ordinary skill to rearrange the supply of the pulse elements mentioned above ejecting the first ink drop by first supplying the falling edge followed by rising edge of pulse elements as mentioned above.

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Regarding claim 5, Kusunoki et al further teaches a second ink drop is discharged at an interval nearly equal to $(n+1/2) \times T_c$ from the first ink drop that precedes the second ink drop (see fig.11a-11b and equation1 in paragraph 0117, each driving pulse in fig.11a discharges an ink droplet at an interval equals to $n \times T_s$, which is nearly equal to $(n+0.5) \times T_c$).

Regarding claim 6, Kusunoki et al substantially teaches the claimed invention (see figs.11, 24, 25) except for the speed of one of the ink drops is set at greater than 3 m/s, and at a speed at which the sequential ink drops are merged. It would have been obvious to one having ordinary skill in the art at the time the invention was made to eject an ink drop at greater than 3 m/s, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Henok Legesse whose telephone number is (571) 270-1615. The examiner can normally be reached on Mon - FRI, 7:30-5:00, ALT.FRI EST.TIME.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax

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phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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08/27/2007



MATTHEW LUU
SUPERVISORY PATENT EXAMINER